
# APC$^{plus}$ – now AVL CPC inside

Count on it

APC$^{plus}$ – The industry standard for particle number measurement now even better with the AVL Condensation Particle Counter (AVL CPC).

Particle number (PN) is an already established metric in all stages of the powertrain development process. The measurement of PN is required for certification of EURO 6 passenger cars and light commercial vehicles (Diesel and Gasoline) as well as EURO VI heavy duty engines. Furthermore PN will be required for the latest Real Driving Emission (RDE) legislation.

## Increased test effort and RDE challenges ahead

- **Legislation** - RDE and WLTP requirements will significantly increase measurement efforts
- **Legislation** - New introduction of particle number limits combined with RDE for China, Korea, India
- **Gasoline** - Stricter particle number limits and RDE for gasoline vehicles → particle filter ahead?
- **Efficiency** - Continuously rising cost pressure and shorter development phases

## APC$^{plus}$ – lower TCO, more functionality

The APC$^{plus}$ – now with AVL CPC inside – fulfills 100% of current legislations with the highest calibration quality according to ISO 17025 and is already prepared for potential new regulations. It is ready for high-end development requirements regarding transient response, measurement range and particle size.
The new core sensor AVL CPC of enhanced functionality further improves the APC$^{plus}$ performance by at the same time optimizing service and calibration costs.

## Future proof technology to be ahead of the RDE challenge

The extended operating temperature range of the AVL CPC with it's enhanced temperature stability enables efficient frontloading via RDE cycles in reproducible test bed environments.

Patented rotating disk diluter

Unique combination of APC$^{plus}$ with AVL Smart Sampler

AVL CPC

The instrument line APC$^{plus}$ ADVANCED with its many patented innovations and unbeatable compactness, offers unique application flexibility. The extended measurement range of the AVL CPC guarantees a maximum of test results even under toughest conditions on the engine test bed.

### Smart integration

AVL ActiveLink™ permits efficient integration into AVL test bed systems and offers the highest user friendliness. Moreover, the unique combination of APC$^{plus}$ and SPC 478 enables the most exact partial flow dilution on the market. Due to the integrated result calculation, it produces highest data quality combined with minimum test effort.

### The brand-new combination of APC$^{plus}$ with built-in AVL CPC allows:

- Highest application flexibility due to a 3-times higher sensor concentration range and best in class dilution accuracy and stability
- Maximum test utilization even under harshest test bed conditions due to 60% higher temperature operating range of the AVL CPC.
- Unique combination of APC$^{plus}$ and AVL Smart Sampler for highest data quality combined with minimum test effort.
- Reduction of service and calibration costs of up to 20% and throughput times of up to 25%.

| Models | APC$^{plus}$ CERTIFICATION with AVL CPC | APC$^{plus}$ ADVANCED with AVL CPC |
|---|---|---|
| Confirmed standards | UN/ECE-R83 (Rev.5), UN/ECE-R49 (Rev.6) | |
| Field of application | Diluted measurement (CVS), partial flow dilution (PFDS) | Diluted measurement (CVS), partial flow dilution (PFDS) raw exhaust measurement |
| Measuring components | Particle number concentration of non-volatile particles (#/cm³) | |
| Measuring range | **0 –30.000 #/cm³** (single count mode) *TSI CPC: 0 … 10.000 #/cm³* | **0 –30.000 #/cm³ (single count mode), linear ($R^2$>0,95) up to 50.000 #/cm³** *TSI CPC: 0 … 10.000 #/cm³* |
| Measuring principle | Laser scattering condensation particle counting (CPC) | |
| Signal processing | **Enhanced single peak detection and counting** *TSI CPC: Threshold pulse counting* | |
| Monitoring of counting efficiency | Pulse height monitoring function (Compliant to Global Technical Regulation No. 15, WLTP) | |
| Lower particle size limit | 23nm (50% ± 12% eff.), 41nm (>90%) | |
| Mean Instrument response time ($t_{90}$) | **4.5 s** *with TSI CPC: 5.0 s* | |
| Mean CPC sensor response time ($t_{90}$) | **2 s** *TSI CPC: 2,5s* | |
| Ambient temperature conditions | **5°C…35°C** (up to 45°C with optional cooling trolley) *with TSI CPC: 5°C … 25°C* | |
| Exhaust gas conditions | Exhaust temperature ≤ 200°C Exhaust pressure ±200 mbar | Exhaust temperature: ≤ 600°C Up to 1000°C with high pressure option Exhaust pressure: ±200 mbar Up to 2000 mbar with high pressure option |
| Sample flow rate | 5 l/min (diluted) | 5 l/min (diluted) 4-7 l/min (raw) |
| Dilution factors | Adjustable in 3 calibrated steps: 100, 500, 2000 | 100 to 20000 (14 steps calibrated): PND1: 10 to 1000 PND2: 10, 15, 20 |
| $PCRF_{TOT}$ | 100…2000 | 100…20000 |
| Volatile particle removal efficiency | 99 % or higher for tetracontane | |
| Temp. evaporation tube | 350°C | 300 - 370°C adjustable |
| Interfaces | **ActiveLink™**, TCP/IP via AK-Protocol, RS232 via AK-Protocol, Hybrid interface (Digital, Analog I/O) | |
| Power supply | 90…240 V AC, 50/60Hz, ~850W | |
| Compressed air supply | < 20 lpm | < 40 lpm |
| Dimensions (main unit) | 482 (19'') x 445 (10HU) x 650 mm (W × H × D) | |
| Weight | ~ 50kg | |

## FOR FURTHER INFORMATION PLEASE CONTACT:

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